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ABSTRACT

A causal model to explain student attrition was tested at a major midwestern land-grant university with a sample of 1,513 full-time, unmarried freshmen who were 21 years old or younger. The causal model was reduced from 23 to 10 variables: an intent variable, three attitudinal variables, and two each of organizational, personal, and environmental variables. Background variables were excluded. The sample was divided into four groups based on the student's sex and level of self-confidence, and multiple regression and path analysis were used to analyze the data. Overall ranking of the independent variables in explaining dropouts, based on effects coefficients, in descending order of importance, was as follows: intent to leave, grades, opportunity to transfer, practical value, certainty of choice, loyalty, family approval, courses, student goals, and major and job certainty. The correlation coefficients ranged from .42 to .50. For each of the four path analyses (high/low confidence women and high/low confidence men), intent to leave had the largest direct influence on dropping out. Also, for each group, the three attitudinal variables (loyalty, certainty, and practical value) had significant negative relationships with intent (with the exception of loyalty for low confidence men). However, the attitudinal variables were not well explained themselves due to relatively high intercorrelations. Recommendations based on the findings are as follows: develop the motivation and learning skills of students so that their grades can rise; demonstrate to students how any major they choose can be of practical value (important for future employment); create a desirable image of the school and identify reasons to be loyal to it; offer courses the students think that they want to take; and develop the student's educational goals. (SW)

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STUDENT ATTRITION, INTENTIONS, AND CONFIDENCE: INTERACTION EFFECTS IN A PATH MODEL PART II. THE TEN VARIABLE MODEL

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PART II. THE TEN VARIABLE MODEL

ABSTRACT

The causal model of student attrition developed in Part I of this paper was reduced to ten independent variables. Background variables were excluded from the analysis. The sample was partitioned into high and low confidence men and women as before. The data was the same as described in Part I. The R^2 ranged from .42 to .50. Overall ranking of the independent variables in 'explaining' dropout, based on effects coefficients, in descending order of importance, was as follows: Intent to leave, grades, opportunity to transfer, practical value, certainty of choice, loyalty, family approval, courses, student goals, and major and job certainty.

STUDENT ATTRITION, INTENTIONS, AND CONFIDENCE:
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Introduction

What causes a student to drop out of school? If there are as many answers to that question as there are students who drop out, then the search for a systematic understanding of the dropout process is destined to failure. As indicated in the first part of this paper (Bean, 1981), about half of the variance in attrition can be explained by a set of twenty-three independent variables. Such a model of the dropout process, while containing many interesting interactions and testing a complex array of variables set forth in a path model, is not a parsimonious explanation of the dropout process.

The purpose of this paper is to estimate a revised model of the dropout process which contains ten independent variables. Specifically, the objective is to assess the relative importance of the various determinants in the model and to determine the explanatory power of the model.

The Causal Model

The dependent variable in this model is dropout, defined as the cessation of enrollment of a student in an institution. Thus, the unit of analysis for the model is an individual at a single institution. Transfers are considered dropouts because they are no longer members of the target institution. Suspended students are also considered dropouts, despite the fact that these students are not voluntary dropouts. They are included because it is felt by the author that expelled students represent failures of the socialization process

more than mental deficiencies (see Note 1, Part I of this paper), and because excluding students who flunk out of school requires the arbitrary exclusion of extremely low values of the variable grades. The terms student attrition and dropout will be used interchangeably.

Part I of this study suggests that the following ten determinants are likely to produce variations in student attrition: intent to leave, practical value, certainty of choice, loyalty, grades, courses, educational goals, major and job certainty, opportunity to transfer, and family approval of the institution. Definitions of these variables are provided in Table 1 of Part I of this study.

The relationships in the causal model are depicted in Figure 1. The arrows in the model represent propositions. For example, the arrow from grades to dropout with a "-" sign indicates the following proposition: Successively higher levels of grades will likely produce successively lower levels of dropout. The arrow from intent with a "+" sign to dropout indicates that successively higher levels of intent to leave produce successively higher levels of dropout. The arrows represent the main line of expected relationships. Other relationships, such as between courses and intent to leave, or educational goals and dropout will also be estimated. The direction of the causation is from left to right. Whether the relationship between the variables is hypothesized to be positive or negative depends on the algebraic product of the signs between the two variables in question through either one or two intervening variables. For example, to determine the direction of the relationship between practical value and dropout, one would multiply the sign between practical value and intent to leave (-) by the sign between intent to leave and dropout (+). The product of (-) x (+) = (-), so the proposition would be stated: Successively higher levels of practical value would likely produce successively lower levels

of dropout. Thus, as practical value increases, dropout would be expected to decline.

The causal model is composed of the intent variable, three attitudinal variables, and two each of the organizational, personal, and environmental variables. There are, however, several differences between the model presented here and the one presented in Part I of this paper. To begin with, the model here has no background variables. Pre-matriculation characteristics are not viewed as contributing significantly to the explained variance in dropout. Their exclusion may result in accusations of spuriosness in the current study. Their effects, however, were already evaluated in Part I of this paper, and their influences on the ten independent variables and on dropout have already been examined, and found to be less important than the other variables in this study. The following 13 variables were excluded from the model: attitudinal variable: satisfaction; organizational variables: contacts with faculty, centralization, memberships in campus organizations, academic program competitive, absenteeism; environmental variables: likelihood of marrying, difficulty of financing school; and background variables: mother's education, father's education, performance, high school and home town size, and distance home. It should be remembered that several of these variables would significantly increase the R^2 of the regressions for one or more of the four groups (high and low confidence men and women). These variables did not, however, consistently contribute to the explained variance of dropout for all four groups. As described in Part I of this paper, the reason these variables were not significant for all groups was in part due to interaction effects. Because of their inconsistent or low level of effects, these variables were excluded from this analysis.

The linkages in the model are similar to those described in Part I of this

paper. In this case, six exogenous variables (the organizational variables, personal variables, and environmental variables) are expected to influence the attitudinal variables in a one-way causal sequence. The model is assumed to be recursive. The attitudes (loyalty, certainty, practical value) are expected to be negatively related to intent to leave. Intent to leave is expected to be positively related to dropout. The underlying causal sequence (attitudes ⟶ intent ⟶ behavior) was hypothesized by Fishbein and Ajzen (1975), although slightly modified for the purpose of this paper, as described in Part I. The linkages are hypothesized to be positive or negative, linear and additive. In addition to the main sequence of causal effects from the organizational, personal, and environmental variables, through the attitudes, and finally through intent to drop out, five other causal linkages are hypothesized. First, grades is hypothesized to have a direct negative relationship with dropout. This relationship was first hypothesized in a causal model by Spady (1970), and would be expected because extremely low levels of grades would result in involuntary separation (suspension or expulsion). Second, the environmental variables (opportunity to transfer and family approval) are expected to have direct effects on intent to leave and dropout. This relationship is hypothesized because environmental effects would be expected to operate regardless of the student's attitudes toward the institution. Thus, the effects of these variables may not be moderated by the attitudinal variables.

It should be emphasized that the label "causal model" is not intended to imply a high level of theoretical or methodological sophistication. The model is a tentative but plausible ordering of the variables which have been demonstrated to influence dropout decisions. The model itself is very much in the development stage.

The model and the ordering of the variables has now been presented. Next, the methodology by which the model was estimated will be described.

Methodology

The data for this analysis is the same as that described in Part I of this paper. The site was a major midwestern land-grant university. The sample consisted of 1,574 full time, unmarried freshmen who were 21 years old or younger, who had not transferred from another institution and were U.S. citizens. Due to the interaction effects described earlier, the sample was partitioned into four groups: high and low confidence men and women. There was a substantial bias toward higher ability students as indicated by ACT scores, specifically, the bottom quartile of ACT scores was underrepresented. This bias both increases sample homogeneity, which is described as desirable (Kerlinger, 1973). It also represents those students the institution would probably be most concerned about losing, e.g., given the option, an institution would ordinarily rather see D students leave school than B students, other things being equal. This bias may, however, reduce the generalizability of the findings.

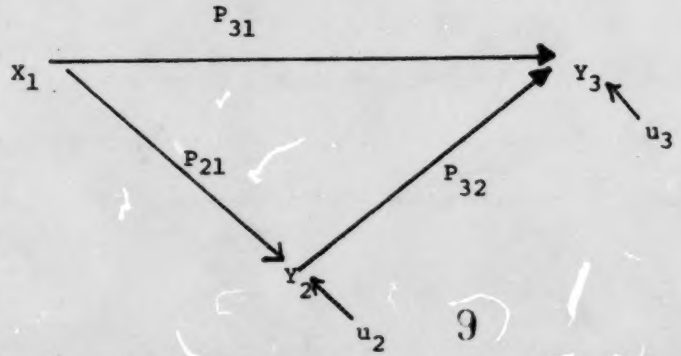
The data was collected by a two-step longitudinal process. Questionnaire data was gathered from the freshmen students during April of 1979. All variables in this study came from this data except the dependent variable. Information related to dropout was taken from registration tapes for the Fall and Spring terms of 1979-80. Of the 1,574 students selected for the analysis, 45 were either stopouts or did not provide a student identification number. In addition, 16 students had missing data for the confidence measure. As a result, the number of students in the four groups totals 1,513. Of these, 18 percent (273) of the students dropped out.

Of the ten independent variables used in this model, five were constructs (intent, practical value, educational goals, major and job certainty, and opportunity to transfer) formed on the basis of factor analysis. Individual items which had factor loadings above .4 were summed to form what Kim and Mueller

(1978) called "factor-based composites." The individual items are summed to form an index for these variables. Cronbach's Alpha was used to assess the reliability for each of these five indices, and averaged .88. Natural log transformations of the variables preceding dropout in the model were used to reduce the influence of extreme values in variables with highly skewed distributions (Walberg and Rasher, 1976; Pascarella and Terenzini, 1979).

Multiple regression and path analysis were selected to analyze the data. Path analysis is a statistical procedure which can be used to estimate both the direct and indirect effects of variables in a system whose causal sequence has already been established (Land, 1969, Kerlinger and Pedhazur, 1973). The paths indicated in Figure 1, as well as those implicit in the model (but not connected by an arrow) will be estimated. Because the model is recursive, ordinary least squares regression analysis can be used to estimate the path values. Path values are the standardized partial regression coefficients (beta weights). The effects coefficients (Lewis-Beck, 1977) represent the total effect of an independent variable on the dependent variable dropout. These effects can be decomposed into the direct effect, and indirect effects through the intervening variables (loyalty, certainty, practical value, and intent to leave) which are placed in the model between the exogenous variables and dropout. Indirect effects for the attitudinal variables are calculated through intent to leave. Direct and indirect effects will be presented in Tables 1 through 4.

An elementary understanding of effects coefficients can be gained from the following diagram:



The total effects of X_1 on Y_3 is defined as the effects coefficient, E_{31}. This coefficient is given in the following equation:

$$E_{31} = P_{31} + P_{32}P_{21};$$

and the effects coefficient of Y_2 on Y_3 is:

$$E_{32} = P_{32}.$$

Thus, the product of the standardized partial regression coefficients (betas) between an independent variable and intervening variable, and the intervening variable to the dependent variable ($P_{32}P_{21}$), added to the direct effect (indicated by the beta between the dependent and independent variable (P_{31}) yields E_{31}, or the total effect of the independent variable X_1 on the dependent variable Y_3. The effects coefficient for Y_2 on Y_3 is equal to the beta weight P_{32}, since there are no intervening variables present. (See Lewis-Beck, 1977; Lewis-Beck and Mohr, 1976).

In distributing the questionnaire, an attempt was made to reach the entire freshman class. The 1,909 respondents were initially reduced to 1,574 to reduce heterogeneity, and further reduced to 1,513 due to missing data and the exclusion of "stopouts" from the sample. The use of significance tests in the analysis was done in order to avoid making arbitrary assumptions about the importance of variables in the model.

As can be seen in Table 1 in Part I of this study, missing data is generally not a problem here, averaging only .3 percent, with the highest being for grades and family approval (seven cases missing in both instances). Pair-wise deletion was used to treat the missing cases in the analysis.

Results

The results for the path analyses appear in Figure 2 for high confidence women, Figure 3 for low confidence women, Figure 4 for high confidence men, and Figure 5 for low confidence men. The findings for each of the four path

models will first be presented. Following this, the findings for the total causal effects, indicated by the effects coefficients, will be presented for the four groups. This will be followed by a discussion of the individual variables.

Results for High Confidence Women(HCW).

Dropout. The ten independent variables in the equation accounted for 50.3 percent of the variance in dropout ($\bar{R}^2$ = .493). ($\bar{R}^2$ refers to the adjusted or shrunken R^2, adjusted to the degrees of freedom). The path coefficient from the unidentified exogenous variables (E_1) was .705. In descending order of importance, the four variables significantly related to dropout were: intent to leave (.714) (numbers following the variable in parentheses are the path coefficients which are the standardized partial regression coefficients); grades (-.155); opportunity to transfer (.098); and loyalty (.097). All effects were in the hypothesized direction except that for loyalty (.097).

Intent to Leave. The nine variables preceeding intent to leave in the model accounted for 33.9 percent of the variance in intent ($\bar{R}^2$ = .327). The beta from the unidentified exogenous variables was .813. In descending order of importance, the five variables in the model significantly related to intent to leave were: loyalty (-.332); certainty of choice (-.262); major and job certainty (.215); practical value (-.190) and educational goals (-.099). Of these variables, all relationships were in the hypothesized direction except for major and job certainty (.215). This unexpected and perplexing relationship was discussed in Part I of this paper.

Practical Value. The six exogenous variables which preceeded practical value in the model accounted for 16.0 percent of the variance in practical value ($\bar{R}^2$ = .150). The beta from unidentified variables was .917. In descending order of importance, the three variables significantly related to practical value were: courses (.240); family approval (.149); and major and job certainty (.149). All relationships were in the hypothesized direction.

Certainty. The six exogenous variables accounted for 22.7 percent of the variance in certainty ($\bar{R}^2$ = .218). The beta from the unidentified variables was .879. In descending order of importance, the four variables significantly related to certainty were: major and job certainty (.259); courses (.247); opportunity to transfer (-.157); and family approval (.132). All relationships were in the hypothesized direction.

Loyalty. The six exogenous variables accounted for 19.1 percent of the variance in loyalty ($\bar{R}^2$ = .181). The beta from the unidentified variables was .899. In descending order of importance, the three variables significantly related to loyalty were: opportunity to transfer (-.330); courses (.169); and major and job certainty (.107). All relationships were in the hypothesized direction.

Results for Low Confidence Women (LCW).

Dropout. The ten independent variables in the equation accounted for 45.8 percent of the variance in dropout for low confidence women ($\bar{R}^2$ = .441). The beta from the unidentified variables was .736. Only two variables were significantly related to dropout: intent to leave (.590) and grades (-.222). Both relationships were in the hypothesized direction.

Intent. The nine variables preceding intent to leave in the model accounted for 39.9 percent of the variance in intent ($\bar{R}^2$ = .383). The beta from the unidentified exogenous variables was .776. In descending order of importance, the five variables significantly related to intent were: practical value (-.324); certainty of choice (-.229); loyalty (-.174); major and job certainty (.143); and opportunity to transfer (.111). Again, all were in the hypothesized direction except for major and job certainty (.143), which was positively related to intent to leave.

Practical Value. The six exogenous variables accounted for 23.7 percent

of the variance in practical value ($\bar{R}^2$ = .223). The beta from the unidentified variables was .874. In descending order of importance, the five variables significantly related to practical value were: courses (.275); educational goals (.207); major and job certainty (.135); grades (.128) and family approval (.112). All relationships were in the hypothesized direction.

Certainty of Choice. The six exogenous variables accounted for 27.7 percent of the variance in certainty ($\bar{R}^2$ = .264). The beta from the unidentified variables was .879. In descending order of importance, the four variables significantly related to certainty of choice were: major and job certainty (.303); courses (.264); opportunity to transfer (-.181); and family approval (.120). All relationships were in the hypothesized direction.

Loyalty. The six exogenous variables accounted for only 9.4 percent of the variance in loyalty ($\bar{R}^2$ = .078). The beta from the unidentified variables was .952. Only two variables were significantly related to loyalty: opportunity to transfer (-.180) and courses (.128). Both relationships were in the hypothesized direction.

Results for High Confidence Men.

Dropout. The ten independent variables in the model accounted for 42.8 percent of the variance in dropout ($\bar{R}^2$ = .415). The beta from the unidentified variables was .756. Again, only two variables were significantly related to dropout: intent to leave (.554) and grades (-.314). Both relationships were in the hypothesized direction.

Intent to Leave. The nine variables preceding intent to leave in the model accounted for 20.2 percent of the variance in intent ($\bar{R}^2$ = .186). The beta from the unidentified variables was .893. In descending order of importance, the six variables significantly related to intent were: certainty of choice (-.159); opportunity to transfer (.151); courses (-.148); practical value (-.131);

loyalty (-.114); and major and job certainty (.108). Again, all these relationships were in the hypothesized direction except major and job certainty (.108), which had a significant positve relationship with intent.

Practical Value. The six exogenous variables accounted for 19.7 percent of the variance in practical value ($\bar{R}^2$ = .187). The beta from unidentified variables was .896. All six exogenous variables were significantly related to practical value. In descending order of importance, these were: courses (.264); educational goals (.176); opportunity to transfer (-.142); major and job certainty (.118); family approval (.094); and grades (-.091). All of these relationships were in the hypothesized direction except grades (-.091) which had a negative relationship with practical value.

Certainty of Choice. The six exogenous variables accounted for 28.1 percent of the variance in certainty of choice (R^2 = .271). The beta from the unidentified variables was .848. In descending order of importance, the five variables significantly related to certainty were: major and job certainty (.283); family approval (.234); courses (.225); opportunity to transfer (-.130); and grades (-.101). All relationships were in the hypothesized direction except grades (-.101) which was negatively related to certainty of choice.

Loyalty. The six exogenous variables accounted for 11.9 percent of the variance in loyalty ($\bar{R}^2$ = .107). The beta from the unidentified variables was .939. In descending order of importance, the three variables which were significantly related to loyalty were: opportunity to transfer (-.196); family approval (.160); and educational goals (.146). All of these relationships were in the hypothesized direction.

Results for Low Confidence Men (LCM)

Dropout. The ten independent variables in the model accounted for 41.8 percent of the variance in dropout for low confidence men ($\bar{R}^2$ = .389). The

beta from the unidentified variables was .763. In descending order of importance, the four variables significantly related to dropout were: intent to leave (.408); grades (-.330); courses (.151); and educational goals (-.141). All relationships were in the hypothesized direction except courses (.151) which was positively related to dropout.

Intent to Leave. The nine variables preceding intent to leave in the model accounted for 34.0 percent of the variance in intent ($\bar{R}^2$ = .311). The beta from the unidentified variables was .812. In descending order of importance, the four variables significantly related to intent were: practical value (-.301); certainty of choice (-.178); grades (-.175), and educational goals (-.132). All of these relationships were in the hypothesized direction.

Practical Value. The six exogenous variables accounted for 21.4 percent of the variance in practical value ($\bar{R}^2$ = .191). The beta from the unidentified exogenous variables was .887. In descending order of importance, the four variables significantly related to practical value were: educational goals (.255); family approval (.167); courses (.150); and major and job certainty (.129). All of these relationships were in the hypothesized direction.

Certainty of Choice. The six exogenous variables accounted for 22.0 percent of the variance in certainty ($\bar{R}^2$ = .197). The beta from the exogenous variables was .883). In descending order of importance, the three variables significantly related to certainty were: courses (.239); opportunity to transfer (-.207); and major and job certainty (.175). All of these relationships were in the hypothesized direction.

Loyalty. The six exogenous variables accounted for 10.6 percent of the variance in loyalty. The beta from the unidentified variables was .945. Only family approval (.211) was significantly related to loyalty, and this was in the hypothesized direction.

Total Causal Effects (The Effects Coefficients)

Effects coefficients represent the total influence of one variable on another, and can be broken down into direct effects and indirect effects. Table 1 has the results for high confidence women, Table 2 for low confidence women, Table 3 for high confidence men, and Table 4 for low confidence men. In addition to the direct and indirect effects on dropout, the rank order of the importance of the variable in its influence on dropout is given in the right-hand column.

Total Effects for High Confidence Women. The results of the analysis of the direct, indirect, and total causal effects for high confidence women are given in Table 1. The rank order for the variables influencing dropout, in decreasing order of importance were as follows: (The number in the parenthesis following the variable is the effects coefficient.) 1. Intent to leave (.714); 2. Opportunity to transfer (.234); 3. Certainty of choice (-.187); 4. Family approval (.159); 5. Grades (-.152); 6. Loyalty (-.139); 7. Practical value (-.137); and 8. Major and job certainty (.088). Both courses and educational goals, tied for ninth, had total effects of -.048. Effects coefficients below .05 are considered by many researchers as not meaningful (Land, 1969; Kerlinger and Pedhazur, 1973, p. 318).

Total Effects for Low Confidence Women. For low confidence women, the results were as follows: 1. Intent (.590); 2. Grades (-.349); 3. Practical value (-.212); 4. Opportunity to transfer (.137); 5. Loyalty (-.119); 6. Family approval (-.084); and 7. Educational goals (-.079). The effects coefficients for courses, certainty of choice, and major and occupational certainty were below .05.

Total Effects for High Confidence Men. For high confidence men, the total effects, in descending order of importance, were as follows: 1. Intent (.554); 2. Grades (-.332); 3. Courses (-.195); 4. Opportunity to transfer (.113);

5. Loyalty (-.093); 6. Practical value (-.069); 7. Certainty of choice (-.061); and 8. Major and occupational certainty (.059). Educational goals and family approval have effects below .05.

Total Effects for Low Confidence Men. For low confidence men, the total effects on dropout, in descending order of importance, were as follows: 1. Intent (.408); 2. Grades (-.401); 3. Educational goals (-.223); 4. Practical value (-.157); 5. Certainty of choice (-.153); 6. Family approval (-.103); 7. Courses (.101); and 8. Major and occupational certainty (.061). Opportunity to transfer and loyalty had effects coefficients below .05.

Mean Total Effects for the Four Groups. The mean ranking of the total effects coefficients provides an economical way to looking at the effects of the various independent variables on dropout. The list below indicates from most important to least important the predictors of dropout (when information on the student's sex or level of confidence is not available). The mean ranking was: 1. Intent to leave; 2. Grades; 3. Opportunity to transfer; 4. Practical value; 5. Certainty of choice; 6. Loyalty; 7. Family approval; 8. Courses; 9. Student goals; and 10. Major and occupational certainty.

Discussion of the Individual Variables

Having now described the findings for the four path models and the results for the effects coefficients, a discussion of the findings for the individual independent variables will now be presented. The variables will be discussed in terms of the differences in the findings between high and low confidence men and women, and the variables contribution to understanding of the attrition process.

Intent to Leave. In each path model, intent to leave had the largest direct influence on dropout. Also, for each group, the three attitudinal variables (loyalty, certainty, practical value) had significant negative

relationships with intent (with the exception of loyalty for low confidence men). As can be seen from Tables 1 through 4, a substantial amount of the total effects, especially of the attitudinal variables, was due to the indirect effects through intent. For example, for low confidence women, practical value had an effects coefficient of .212, and was ranked third in importance in influencing dropout. Of this total effect, 9.9 percent (-.021/-.212) was due to direct effects, while 90.1 percent (-.191/-.212) was due to indirect effects through intent. Indirect effects on dropout through intent were larger than direct effects for practical value (for high confidence women, low confidence women, high confidence men, and low confidence men); for loyalty (for high confidence women, low confidence women, and high confidence men); for certainty of choice (for high confidence women, low confidence women, and high confidence men) for courses (for high confidence women, low confidence women, and high confidence men); for educational goals (for high confidence women and low confidence women); for major and job certainty (for high confidence women, low confidence women, and high confidence men); for opportunity to transfer (for low confidence women and high confidence men); but not for family approval. The critical importance of intent in the model should be clear, and the location of intent in the model, between the attitudinal variables and the behavior in question (dropout), as suggested by Fishbein and Ajzen (1975), is well substantiated by these findings.

Practical Value. Practical value's influence on dropout was ranked seventh for high confidence women, third for low confidence women, sixth for high confidence men, and fourth for low confidence men. This relationship was negative in each case, which was the hypothesized direction. For no group was practical value directly related to dropout. For low confidence men and women, practical value was the best predictor of intent to leave, ranking third or fourth in importance in influencing dropout. Courses, major and job certainty, and family

approval were positively related to practical value for each of the four groups. In addition, 12 significant indirect effects were calculated through practical value for the four path models. Practical value, seemed indeed to be an important variable, located properly in the path model, and contributing in an important way in explaining the dropout process.

Certainty of Choice. The influence of certainty of choice on dropout was through intent to leave, where in each case except for low confidence men, the indirect effects on dropout through intent were greater than the direct effects. Certainty's influence on dropout was ranked third for high confidence women, ninth for low confidence women, seventh for high confidence men, and fifth for low confidence men. Certainty was either the first or second most important variable in influencing intent to leave (First for high confidence men, second otherwise). Courses and major and job certainty were positively related to certainty of choice for each group; opportunity to transfer was negatively related to certainty of choice for each group. Grades had a significant negative relationship with certainty of choice for high confidence men, contrary to the expected direction. This suggests an interaction effect where men who lack confidence are certain of their choice in a school regardless of their grades, whereas men with high confidence and high grades may have been uncertain of their choice in a school because the school was not challenging enough for them. It should be noted that for low confidence men, and high and low confidence women, grades were not significantly related to certainty of choice. Again, the placement of certainty seems justified due to its consistent significant relationship to intent, and because two-thirds (16 of 24) of the exogenous variables in the four models showed significant indirect effects on dropout through certainty of choice.

Loyalty. Loyalty's influence on dropout was ranked sixth for high confidence women, fifth for low confidence women, fifth for high confidence men,

and tenth for low confidence men. For the three significant relationships to intent to leave (high confidence women, low confidence women, high confidence men), each was negative which was the hypothesized direction. Loyalty was not significantly related to dropout, but consistently contributed its influence on dropout through intent to leave. For low confidence men, loyalty was relatively unimportant in predicting dropout, and only family approval has a significant positive relationship with loyalty. Loyalty appeared to be of greater importance for women than for men in influencing intent to leave (most important for high confidence women, third most important for low confidence women, fifth in importance for high confidence men, and not significantly related for low confidence men). For all four groups, loyalty did not contribute consistent indirect effects on dropout. Such effects existed in only 8 of 24 instances. For high confidence women, however, loyalty was the best predictor of intent to leave. It would have had a higher ranking in influencing dropout for this group except that it had, contrary to expectations, a positive significant relationship to dropout. Since stopouts were excluded from the analysis, stopping out would not seem to explain this finding. This finding, however, could represent stopouts who had not chosen to return during the period (one year) during which information was gathered for the dependent variable and for identifying stopouts. The location of loyalty in the model is consistent with the findings for three of the four groups, but not for low confidence men. For high confidence men, low confidence women and high confidence women, opportunity to transfer had a consistent significant negative relationship with loyalty. This finding was expected for all four groups. Also, family approval had a significant positive relationship for loyalty for high and low confidence men, but not for women. It will be noted later that family approval significantly influences at least two of the attitudinal variables for each group, and represents an area of great potential for changing student attitudes in order to reduce dropout.

University Grades. University grades had an overall ranking of second in importance in influencing dropout for the four groups. It was ranked second in importance for low confidence women and for high and low confidence men, and was ranked fifth for high confidence women. In each case, most of its influence was due to its direct effects on dropout, and not from indirect effects through intent to leave or the attitudinal variables. Grades was significantly related to practical value for low confidence women and high confidence men, and to certainty for high confidence men, and in no case related to loyalty. This direct influence on dropout appears in Spady's (1970) model, and was hypothesized in this study. This location in the model seems well justified based on the current study.

Courses. The second organizational variable in the model was courses, which, in total effects, was ranked ninth for high confidence women, eighth for low confidence women, third for high confidence men, and seventh for low confidence men. The variable had comparatively more important effects on dropout for men than for women, and more important effects for high confidence than low confidence men. In each group, courses had a significant positive relationship with practical value and certainty of choice. These findings implied that these important attitudes were, at least in part, the result of the curricular offerings. In the one instance where courses was significantly related directly to intent (high confidence men), the relationship was in the expected negative direction. Again, the location of this variable in the path model seems well justified.

Educational Goals. Educational goals had an overall ranking of ninth, and was ranked variously ninth for high confidence women, seventh for low confidence women, ninth for high confidence men, and third for low confidence men. The

effects of this variable ranged widely. For low confidence men, educational goals were extremely important, with significant negative effects on intent to leave and dropout, and with significant positive effects on practical value. For high confidence men, educational goals had a significant positive relationship with loyalty and practical value. For low confidence men and low confidence women, educational goals was significantly related only to practical value, and for high confidence women, educational goals was significantly related only to intent to leave. All relationships were in the expected direction, but the way in which this variable affected the different groups varied widely. Where men lacked confidence, lacking educational goals was a serious problem. When men were confident, the educational goals positively affected their attitudes, but did not affect intent to leave or dropout in a significant manner. Again, level of confidence compensated for lack of educational aspirations in influencing dropout.

Major and Job Certainty. Major and job certainty was ranked tenth overall -- on the average, it was the least important variable in the model for influencing dropout. For high confidence women, it was ranked eighth, for low confidence women tenth, for high confidence men eighth, and for low confidence men eighth. For each group, it had positive significant relationship with certainty of choice and practical value, and in three of four groups (excluding low confidence men) it had significant positive relationships to intent to stay. As described in Part I of this paper, this finding was contrary to the expected direction, and might be explained either by being certain of a major which was not offered at the institution, or being certain of a job that did not require more schooling. The relationships with the attitudinal variables were in the expected direction, while the relationships with intent to leave was contrary to the expected direction. Further study, and perhaps a change in operationalization of the variable are needed before any firm conclusions about the influence

of major and job certainty can be made.

Opportunity to Transfer. Opportunity to transfer is an environmental variable, and one about which the institution can ethically do little. It was extremely important in the path model, however, because its effects on attitudes, intent, and dropout, which were consistently negative for women, and consistently negative where significant for men. Overall, the variable was ranked third in total causal effects, while ranked second for high confidence women, fourth for low confidence women, fourth for high confidence men, and ninth for low confidence men. For women, the variable was extremely important in explaining dropout. It had a significant negative influence on loyalty and certainty. For high confidence women, it had a direct positive influence on dropout and for low confidence women, a significant positive influence on intent to leave. For high confidence men, the variable had a significant positive relationship to intent, and significant negative relationships to the three attitudinal variables. For men who were not confident of their abilities to be successful students at the target institution, opportunity to transfer reduced certainty of choice, but was not significantly related to any other variables in the model. The importance of this environmental variable has largely been overlooked in other dropout studies. Its location in the model and its importance in this study justify its further investigation.

Family Approval. Family approval, ranked sixth in importance in determining dropout overall, and was ranked fourth for high confidence women, sixth for low confidence women, tenth for high confidence men, and sixth for low confidence men. Family approval had positive significant relationships to practical value for all groups for certainty of choice for high confidence women, low confidence women, and high confidence men, and significant positive relationships to loyalty for both high and low confidence men. Family approval played a prominent role in influencing the attitudes of students in all categories, and its importance

should not be overlooked in future studies. It is the second important environmental variable in this study. This variable may be influenced legitimately by the institution through various outreach programs for parents. Opportunity to transfer probably cannot be influenced by the institution through legitimate means.

Conclusion

Summary. The ten independent variable model of student attrition described and estimated in this paper has been shown to be of substantial value in understanding the dropout process among the relatively higher ability freshman students at one major land-grant university in the midwest. In this model, reduced from 23 variables in Part I of this paper, there were no background variables, two each of the organizational, personal, and environmental variables, the three attitudinal variables, and intent to leave as the immediate precursor of dropout. The model accounted for a comparatively high amount of the variance in dropout without using interaction terms, although the original homogeneous sample was divided into four groups based on the student's sex and level of confidence. The adjusted R^2 for the four groups was: .493 for high confidence women, .441 for low confidence women; .415 for high confidence men, and .389 for low confidence men. Each of the variables the model contributed significantly to understanding some part of the dropout process for one or more of the four groups. In each case, intent to leave was the best predictor of actual attrition.

Future Research. The variables in this path model did a relatively satisfactory job in explaining the variance in dropout and in intent to leave. The attitudinal variables were demonstrated to be important in explaining intent, but were not well explained themselves. Better predictors of these attitudes should be located. Also, due to the relatively high intercorrelation among these attitudinal variables (multicolinearity), their full impact might not have been

indicated in past multivariate studies. Their total effects here give them an overall ranking of fourth, fifth, and sixth in their influence on dropout. Multicollinearity was the chief reason that satisfaction failed to contribute significantly to dropout or intent to leave when controlling statistically for the other attitudes, and why it was excluded from the present study. Still, other important attitudes should be estimated in the context of the path analytic framework suggested by the path model presented in Figure 1. Finally, interaction effects were not hypothesized for any of these variables, but certainly some could exist, violating the assumption of additivity in the path model. The treatment of interaction terms in path models is difficult, if not impossible, due to the high multicollinearity of the main effects variables and their interaction terms. Further research is also needed in the area of interaction terms among the variables in this model, and in path models in general.

Practical Recommendations. The current study bears much food for thought for those faculty, administrators, parents and students who are concerned with dropout. Based on the current study, it seems clear that in one circumstance or another, all of the independent variables in the path model may play an important part in a student's decision to drop out of school. One should realize that men and women, and students with high or low levels of confidence are likely to leave school for different reasons. With the expectation of the negative influence of grades on certainty to high confidence men, and the positive influence of major and job certainty on intent to leave for all except low confidence men, taking the recommended actions universally would not increase a student's likelihood of dropping out regardless of sex or level of confidence. Therefore, acting across the board for the issues below should help to reduce attrition. Intent to leave and opportunity to transfer, despite their importance in influencing dropout, cannot be directly influenced in any rational fashion. The

practical recommendations for reducing attrition based on this study, recommendations which are consistent with those made in Part I of this paper, follow:

1. Develop the motivation and learning skills of students so that their grades can rise. The influence of low grades on dropout is severe and real.

2. Demonstrate to the students how any major they choose can be of practical value, that is, important for employment opportunities after graduation. This action can be taken directly by the institution, through special programs, but the faculty who are in daily contact with the students should know how the subjects they teach will later fit into a career. It is often the conceptual, analytical or communication skills developed that are important to the future employer, rather than the course content. Only poorly taught courses may be "irrelevant."

3. Through the faculty and staff, as well as co-curricular programs for students and outreach programs for parents and prospective students, create a desirable image of the school and identify reasons to be loyal to it. Provide a supporting environment for students who are concerned about whether or not they made the right choice in coming to the school; offer programs that create loyalty to the institution through the use of rituals, co-curricular experiences, and written material, and pay attention to what parents think about the institution.

4. Offer courses the students think that they want to take, either by marketing the curriculum in place, or modifying the course offerings to meet student needs and demand.

5. Develop the student's educational goals. Make clear to the student what the degree options are in various fields, and what the expected outcome or value of the degree will be.

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Figure 1. A Ten-Variable Causal Model of the Attr'tion Process

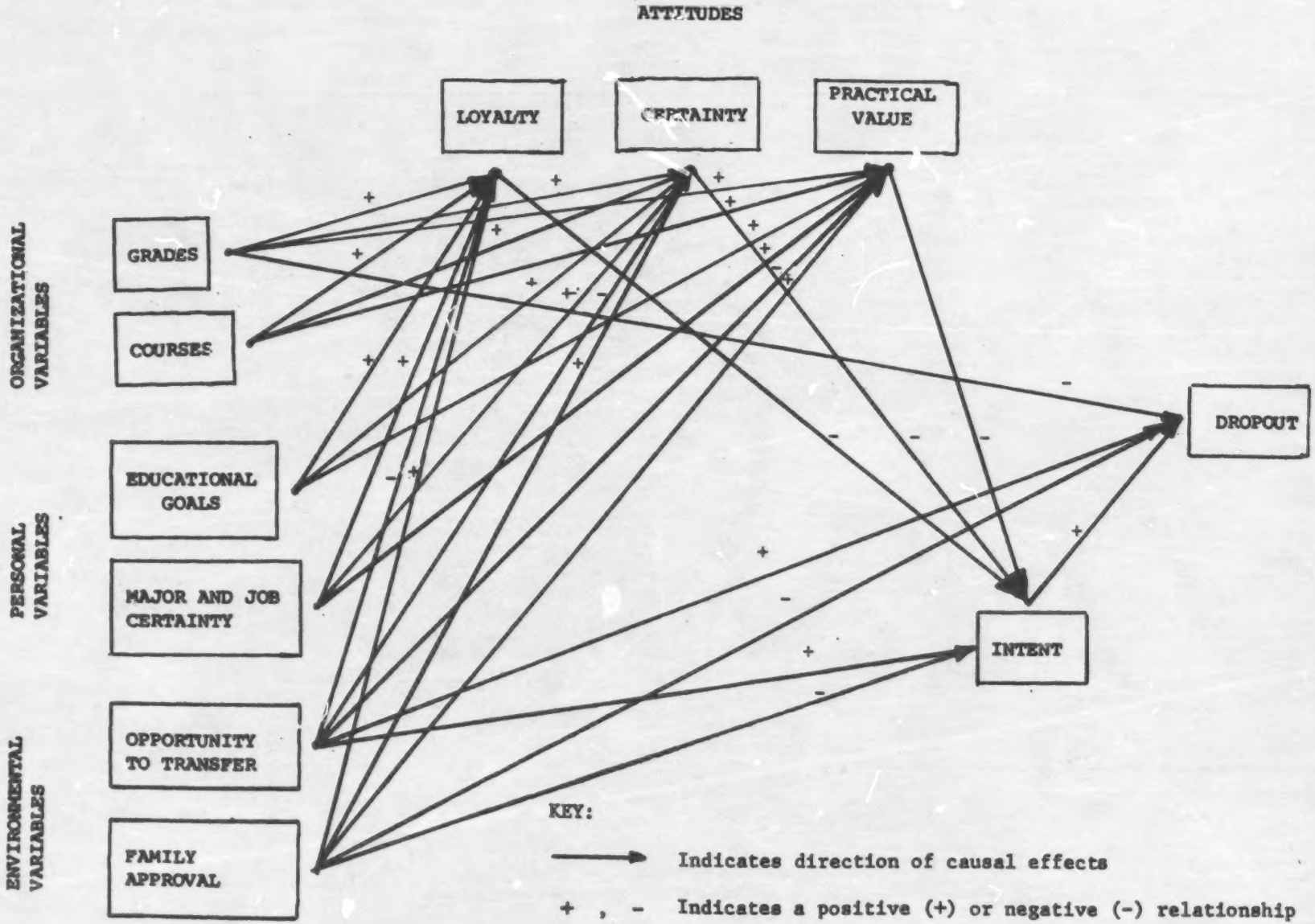
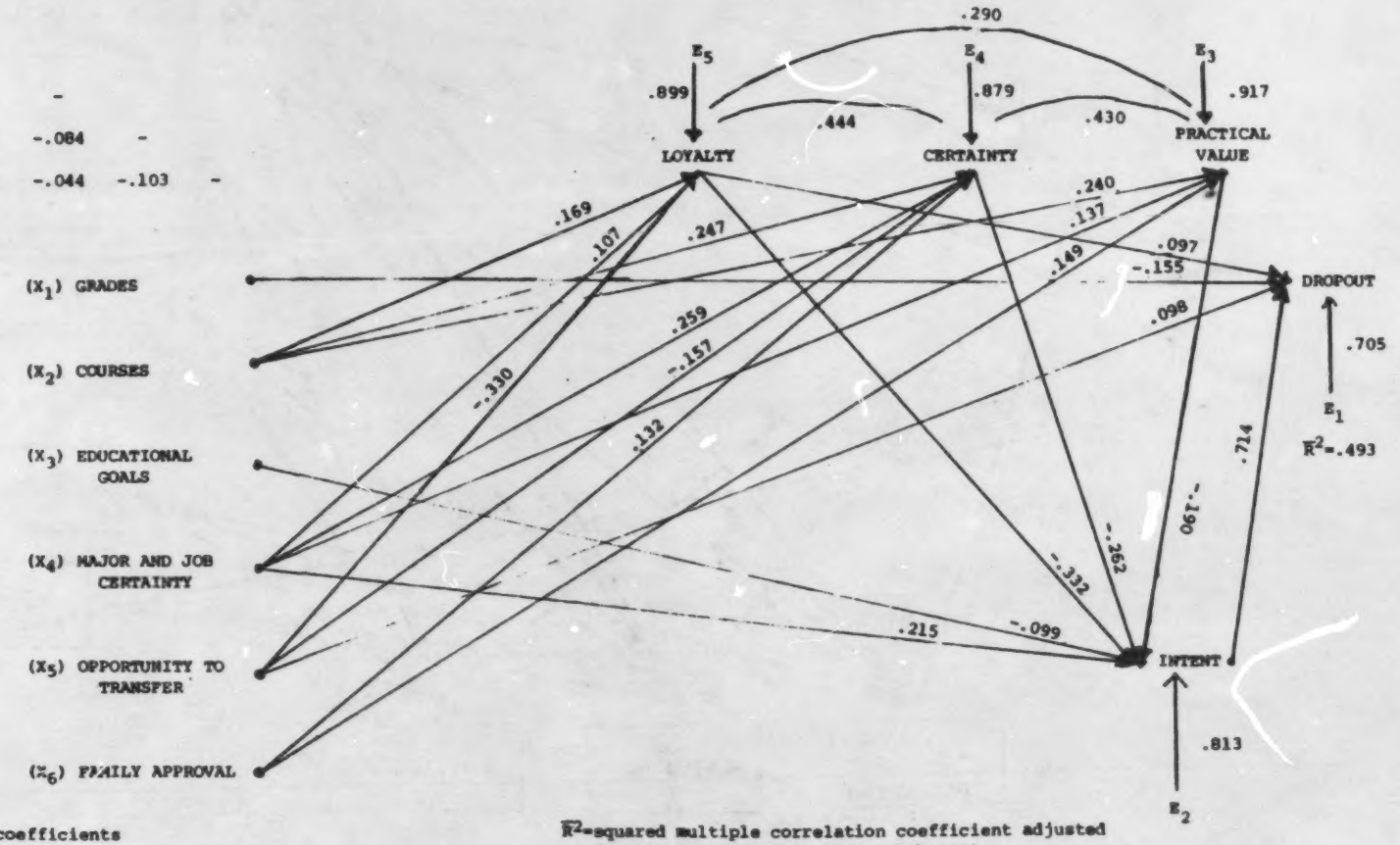


Figure 2. MODEL OF THE VARIABLES AFFECTING STUDENT ATTRITION FOR HIGH CONFIDENCE WOMEN (N=499)

Correlation Matrix

	X_1	X_2	X_3	X_4	X_5	X_6
X_1						
X_2	.039	-				
X_3	.077	.110	-			
X_4	-.051	.162	.284	-		
X_5	.037	.158	-.130	-.084	-	
X_6	.023	.200	.126	-.044	-.103	-



KEY: ⌒ correlation coefficients

⟶ indicates causal linkages ($P \leq .05$)

Numbers indicate the relative strength and direction of the influence of one variable on another (betas)

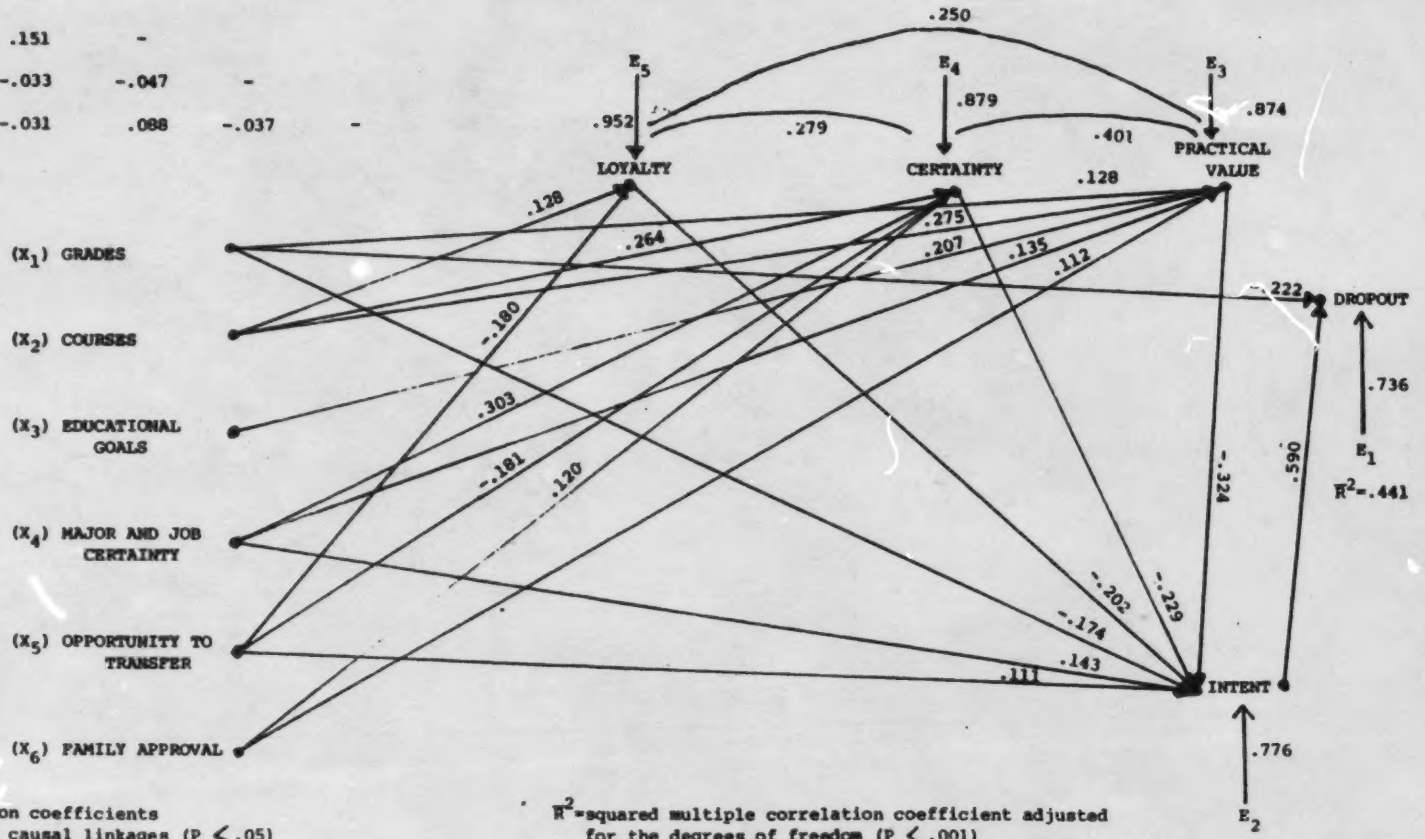
$\bar{R}^2$=squared multiple correlation coefficient adjusted for the degrees of freedom ($P \leq .001$)

E_1 to E_5 represent influences due to unidentified variables, i.e., betas from exogenous variables

Figure 3. MODEL OF THE VARIABLES AFFECTING STUDENT ATTRITION FOR LOW CONFIDENCE WOMEN (N = 338)

Correlation Matrix

	X_1	X_2	X_3	X_4	X_5	X_6
X_1						
X_2	.035	-				
X_3	.133	.1 3	-			
X_4	.014	.068	.151	-		
X_5	-.078	-.117	-.033	-.047	-	
X_6	.046	.211	-.031	.088	-.037	-



KEY: ⌒ correlation coefficients
→ indicates causal linkages ($P \leq .05$)

Numbers indicate the relative strength and direction of the influence of one variable on another (betas)

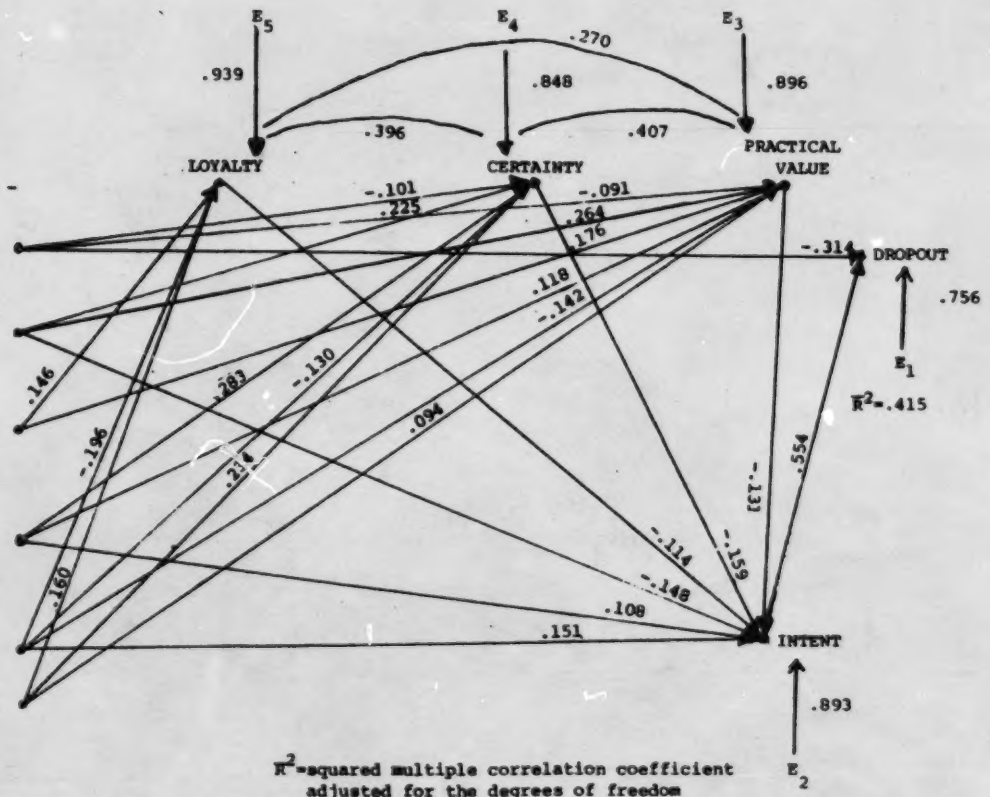
R^2=squared multiple correlation coefficient adjusted for the degrees of freedom ($P \leq .001$)

E_1 to E_5 represent influences due to unidentified variables, i.e., betas from exogenous variables

Figure 4. MODEL OF THE VARIABLES AFFECTING STUDENT ATTRITION FOR HIGH CONFIDENCE MEN (N=465)

Correlation Matrix

	X_1	X_2	X_3	X_4	X_5	X_6
X_1						
X_2	.041	-				
X_3	.168	.123	-			
X_4	.024	.080	.219	-		
X_5	-.079	-.124	-.038	-.048	-	
X_6	-.112	.202	.073	.022	-.148	-



KEY: ⌒ correlation coefficient

⟶ indicates causal linkages ($P \leq .05$)

Numbers indicate the relative strength and direction of the influence of one variable on another (betas)

R^2=squared multiple correlation coefficient adjusted for the degrees of freedom ($P \leq .001$)

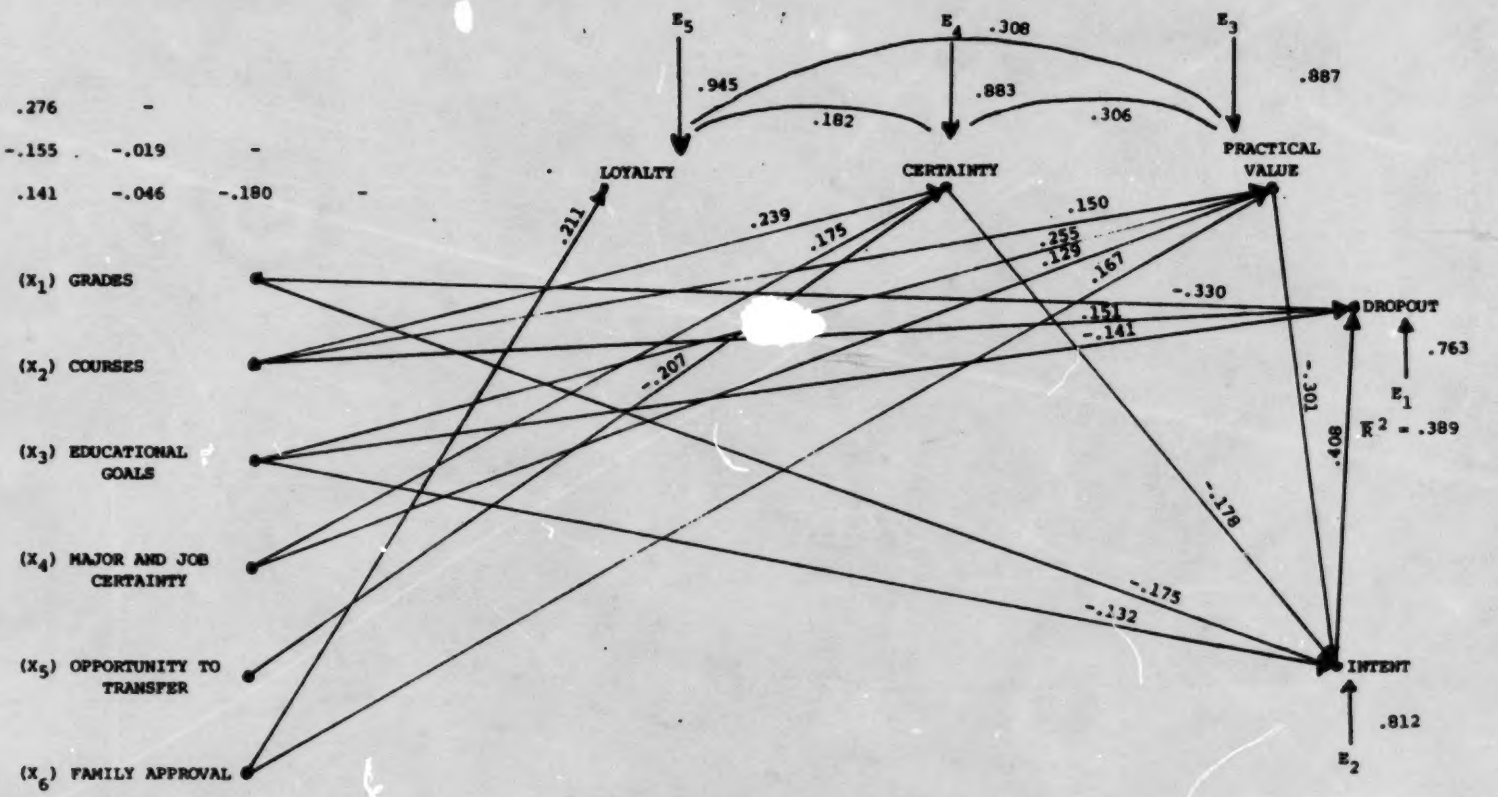
E_1 to E_5 represent influences due to unidentified variables, i.e., betas from exogenous variables

Figure 5. MODEL OF THE VARIABLES AFFECTING STUDENT ATTRITION FOR LOW CONFIDENCE MEN

(N = 211)

Correlation Matrix

	x_1	x_2	x_3	x_4	x_5	x_6
x_1						
x_2	.062	-				
x_3	.148	.280				
x_4	.085	.161	.276	-		
x_5	-.026	-.102	-.155	-.019	-	
x_6	-.076	.188	.141	-.046	-.180	-



KEY: ⌒ correlation coefficients

⟶ indicates causal linkages ($P \leq .05$)

Numbers indicate the relative strength and direction of the influence of one variable on another (betas)

$\bar{R}^2$ = squared multiple correlation coefficient adjusted for the degrees of freedom ($P \leq .001$)

E_1 to E_5 represents influences due to unidentified variables, i.e., betas from exogenous variables

Table 1. DIRECT, INDIRECT, AND TOTAL EFFECTS ON DROPOUT AND RANK IN INFLUENCING DROPOUT FOR HIGH CONFIDENCE WOMEN

Variable	Direct Effects On Dropout[a]	Indirect Effects Through Intent[a]	Indirect Effects Through Practical Value[b]	Indirect Effects Through Certainty[b]	Indirect Effects Through Loyalty[b]	Total Effects on Dropout	Rank
Intent	.714					.714	1
Practical Value	-.001	-.136				-.137	7
Loyalty	.098	-.237				-.139	6
Certainty of Choice	.000	-.187				-.187	3
University Grades	-.155	.003				-.152	5
Courses	.015	.056	-.033	-.046	-.040	-.048	9
Educational Goals	.023	-.071				-.048	9
Major and Occupational Certainty	.026	.154	-.019	-.048	-.025	.088	8
Opportunity to Transfer	.097	.021		.038	.078	.234	2
Family Approval	.119	.035	-.020	.025		.159	4

[a]Includes both significant and nonsignificant effects

[b]Includes only significant effects

Table 2. DIRECT, INDIRECT, AND TOTAL EFFECTS ON DROPOUT AND RANK IN INFLUENCING DROPOUT FOR LOW CONFIDENCE WOMEN

Variable	Direct Effects On Dropout[a]	Indirect Effects Through Intent[a]	Indirect Effects Through Practical Value[b]	Indirect Effects Through Certainty[b]	Indirect Effects Through Loyalty[b]	Total Effects on Dropout	Rank
Intent	.590					.590	1
Practical Value	-.021	-.191				-.212	3
Loyalty	.000	-.119				-.119	5
Certainty of Choice	.100	-.135				-.035	9
University Grades	-.222	-.103	-.024			-.349	2
Courses	.016	.026	-.035	-.036	-.015	-.044	8
Educational Goals	-.018	-.021	-.040			-.079	7
Major and Occupational Certainty	-.029	.084	-.026	-.041		-.012	10
Opportunity to Transfer	.027	.065		.024	.021	.137	4
Family Approval	-.031	-.016	-.021	-.016		-.084	6

[a]Includes both significant and nonsignificant effects

[b]Includes only significant effects

Table 3. DIRECT, INDIRECT, AND TOTAL EFFECTS ON DROPOUT AND RANK IN INFLUENCING DROPOUT FOR HIGH CONFIDENCE MEN

Variables	Direct Effects On Dropout[a]	Indirect Effects Through Intent[a]	Indirect Effects Through Practical Value[b]	Indirect Effects Through Certainty[b]	Indirect Effects Through Loyalty[b]	Total Effects on Dropout	Rank
Intent	.554					.554	1
Practical Value	.004	-.073				-.069	6
Loyalty	-.013	-.080				-.093	5
Certainty of Choice	.027	-.088				-.061	7
University Grades	-.314	-.034	.007	.009		-.332	2
Courses	-.055	-.101	-.019	-.020		-.195	3
Educational Goals	.027	.026	-.013		-.012	.028	9
Major and Occupational Certainty	.033	.060	-.009	-.025		.059	8
Opportunity to Transfer	-.009	.084	.011	.011	.016	.113	4
Family Approval	.055	.010	-.007	-.021	-.013	.025	10

[a]Includes both significant and nonsignificant effects

[b]Includes only significant effects

Table 4. DIRECT, INDIRECT, AND TOTAL EFFECTS ON DROPOUT AND RANK IN INFLUENCING DROPOUT FOR LOW CONFIDENCE MEN

Variables	Direct Effects On Dropout[a]	Indirect Effects Through Intent[a]	Indirect Effects Through Practical Value[b]	Indirect Effects Through Certainty[b]	Indirect Effects Through Loyalty[b]	Total Effects on Dropout	Rank
Intent to Leave	.408					.408	1
Practical Value	-.034	-.123				-.157	4
Loyalty	.063	-.029				.034	10
Certainty of Choice	-.080	-.073				-.153	5
University Grades	-.330	-.071				-.401	2
Courses	.151	-.015	-.018	-.017		.101	7
Educational Goals	-.141	-.054	-.028			-.223	3
Major and Occupational Certainty	.108	-.018	-.016	-.013		.061	8
Opportunity to Transfer	-.068	.014		.015		-.039	9
Family Approval	-.089	.007	-.021			-.103	6

[a]Includes both significant and nonsignificant effects

[b]Includes only significant effects